53. (New) The apparatus according to claim 40, wherein the image data and the data associated with the printing element drive timing are output in the same bus format.

REMARKS

Reconsideration and withdrawal of the rejections set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1-53 are now pending in the application, with Claims 1, 7, 15, 22, 25, 28, 32, 36, and 40 being independent. Claims 1, 7, 15, 22, 25, 28, 32, 36 and 40 have been amended and Claims 45-53 have been added herein.

Support for the newly-presented dependent claims can be found in the specification with regard to the discussion of Fig. 4. Of course, the claims are not intended to be limited in scope to this preferred embodiment.

In the Office Action Summary, the Examiner indicated that "b) Some" of the certified copies of the priority documents have been received. However, priority in this case is based on a single foreign patent application and a certified copy of that application has been submitted. Accordingly, it is requested that correction of the acknowledgement of the claim to foreign priority be made with the next Office Action.

Claims 1-44 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,646,660 (Murray) in view of U.S. Patent No. 4,455,578 (Fearnside). This rejection is respectfully traversed.

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Each of independent Claims 1, 7, 22, 25, 32 and 36 recites, inter alia, that image data and/or block selection data are inputted into a printhead in a bus format of a plurality of bits. By virtue of this feature, data transfer speed to a printhead can be increased without increasing clock frequency, even if the number of printing elements is increased.

Independent Claims 15, 28 and 40 recite, inter alia, that image data and data associated with a printing element driving timing are continuously received. By virtue of this feature, the number of signal lines used for data transferred to a printhead can be reduced without decreasing data transfer speed, thus resulting in the capability of reducing the size of the printhead.

Murray relates to an ink cartridge that includes a drive logic integrated circuit. As understood by Applicant, Murray describes a conventional thermal ink jet printhead for driving printing elements in accordance with data inputted from a printer system. As recognized by the Examiner, Murray does not disclose a printhead receiving external image data and block selection data in a bus format. Moreover, Applicant submits that Murray does not disclose or suggest continuously receiving image data and data associated with a printing element driving timing. Accordingly, Murray fails to disclose or suggest important features of the present invention recited in the independent claims.

Fearnside relates to an exposure apparatus for a photosensitive web using an LED array. As understood by Applicant, image signals and subarray select signals are sent from a data source 18 to a control assembly 22 in a bus format. However, Applicant submits that in Fig. 1 of Fearnside, LED array 10 would correspond to a printhead.

Accordingly, the control assembly 22 is included in image processing electronics 14, which would correspond to a control circuit in a printer main body, not in the printhead. Therefore, the data transfer in bus format in Fearnside is performed within the printer main body, which is conventional printer construction. The printhead 10 in Fearnside receives driving signals for all of the LEDs with signal lines of the same number of LEDs. With this description, Fearnside teaches away from Applicant's invention.

Accordingly, Fearnside does not disclose or suggest a printhead in which image data and/or block selection data are input in a bus format of a plurality of bits. Nor does Fearnside disclose or suggest continuously receiving image data and data associated with a printing element driving timing. Accordingly, Fearnside fails to remedy the deficiencies of Murray noted above with respect to the independent claims.

Thus, independent Claims 1, 7, 15, 22, 25, 28, 32, 36, and 40 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejections are respectfully requested.

For the foregoing reasons, Applicant respectfully submits that the present invention is patentably defined by independent Claims 1, 7, 15, 22, 25, 28, 32, 36, and 40. Dependent Claims 2-6, 8-14, 16-21, 23, 24, 26, 27, 29-31, 33-35, 37-39 and 41-53 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

Applicant submits that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1.   (Twice Amended) A printhead comprising:

a plurality of printing elements for printing;

a block selection circuit that outputs a selection signal for selecting a block

comprising a plurality of printing elements [to be simultaneously driven];

a printing control circuit which outputs a driving signal for selectively

driving said printing elements, together with the selection signal, to each of said printing

elements in correspondence with image data; and

an input portion, which receives external image data to be input to said

printing control circuit,

wherein said input portion is adapted to receive the image data and block

selection data input to said block selection circuit in a bus format of a plurality of

[consecutive] bits.

7.   (Twice Amended) A printhead comprising:

a plurality of printing elements for printing;

a block selection circuit that outputs a selection signal for selecting a block

comprising a plurality of printing elements [to be simultaneously driven];

a printing control circuit which outputs a driving signal for selectively

driving said printing elements, together with the selection signal, to each of said printing

elements in correspondence with image data; and

an input portion, which receives external image data to be input to said

printing control circuit,

wherein said input portion is adapted to receive the image data in a bus

format of a plurality of bits.

15.   (Twice Amended) A printhead comprising:

a plurality of printing elements for printing;

a block selection circuit that outputs a selection signal for selecting a block

comprising a plurality of printing elements [to be simultaneously driven];

a printing control circuit which outputs a driving signal for selectively

driving said printing elements, together with the selection signal, to each of said printing

elements in correspondence with image data; and

an input portion, which receives external image data to be input to said

printing control circuit,

wherein said input portion is adapted to continuously receive the image data

and data associated with a printing element driving timing.

22.   (Twice Amended) A method of driving a printhead including a

plurality of printing elements for printing, a block selection circuit for outputting a

selection signal for selecting a block of a plurality of printing elements [to be

simultaneously driven], a printing control circuit for outputting a driving signal for

selectively driving the printing elements, together with the selection signal, to each of the

printing elements in correspondence with image data, and input means for receiving

external image data to be input to the printing control circuit, said method comprising the

steps of:

causing the input means to receive the external image data and block

selection data input to the block selection circuit in a bus format of a plurality of

[consecutive] bits; and

causing the printing control circuit to drive the printing elements of the

block selected by the block selection circuit in correspondence with the image data.

25. (Twice Amended) A method of driving a printhead including a

plurality of printing elements for printing, a block selection circuit for outputting a

selection signal for selecting a block of a plurality of printing elements [to be

simultaneously driven], a printing control circuit for outputting a driving signal for

selectively driving the printing elements, together with the selection signal, to each of the

printing elements in correspondence with image data, and input means for receiving

external image data to be input to the printing control circuit, said method comprising the

steps of:

causing the input means to receive the external image data in a bus format

of a plurality of bits; and

causing the printing control circuit to drive the printing elements of the

block selected by the block selection circuit in correspondence with the image data.

28.   (Twice Amended) A method of driving a printhead including a plurality of printing elements for printing, a block selection circuit for outputting a selection signal for selecting a block of a plurality of printing elements [to be simultaneously driven], a printing control circuit for outputting a driving signal for selectively driving the printing elements, together with the selection signal, to each of the printing elements in correspondence with image data, and input means for receiving external image data to be input to the printing control circuit, said method comprising the steps of:

causing the input means to receive data associated with a printing element driving timing continuously with the image data; and

causing the printing control circuit to drive the printing elements of the block selected by the block selection circuit in correspondence with the image data.

32.   (Twice Amended) A data output apparatus for outputting image data and a block selection signal to an input portion of a printhead, the printhead including (i) a plurality of printing elements for printing, (ii) a block selection circuit for outputting the selection signal for selecting a block of a plurality of printing elements [to be simultaneously driven], (iii) a printing control circuit for outputting a driving signal for selectively driving the printing elements together with the selection signal to each of the printing elements in correspondence with the image data, and (iv) the input portion, which receives external image data to be input to the printing control circuit, said apparatus comprising:

an output unit that outputs the image data and block selection data input to the block selection circuit in a bus format of a plurality of [consecutive] bits.

36. (Twice Amended) A data output apparatus for outputting image data to an input portion of a printhead, the printhead including (i) a plurality of printing elements for printing, (ii) a block selection circuit for outputting a selection signal for selecting a block of a plurality of printing elements [to be simultaneously driven], (iii) a printing control circuit for outputting a driving signal for selectively driving the printing elements in the block, the printing control circuit adapted to output the driving signal together with the selection signal to each of the printing elements in correspondence with the image data, and (iv) the input portion, which receives external image data to be input to the printing control circuit, said apparatus comprising:

an output unit that outputs the image data in a bus format of a plurality of bits.

40. (Twice Amended) A data output apparatus for outputting image data to an input portion of a printhead, the printhead including (i) a plurality of printing elements for printing, (ii) a block selection circuit for outputting the selection signal for selecting a block of a plurality of printing elements [to be simultaneously driven], (iii) a printing control circuit for outputting a driving signal for selectively driving the printing elements in the block, the printing control circuit adapted to output the driving signal together with the selection signal to each of the printing elements in correspondence with

the image data, and (iv) the input portion, which receives external image data to be input to the printing control circuit,

wherein said data output apparatus continuously outputs the image data and data associated with a printing element driving timing.